OPERATION FOR HYPOSPADIAS.

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In the *British Medical Journal* of November 17, 1900, I published the description of an operation that I had devised for severe hypospadias, with a photograph illustrating the result obtained, in a case on which the operation had been practised. Upon the method I was privileged to bring forward, I founded very high hopes, as will be evident to any one who may care to read my communication. Incidentally I hazarded the remark that the case reported was in my belief the best result that had ever been obtained in a case of complete perineo-scrotal hypospadias. It has been something of a disappointment to me that, since the publication alluded to, I have never seen any account in current surgical literature of a case in which my method has been adopted for the remedying of this dreadful malformation; nor does it seem to have been successful in attracting the favorable notice of surgical authors in general, despite the fact that in the last edition of Jacobson's work on the "Operations of Surgery," the method I allude to receives full description and illustration, in company with that of Duplay. The only other surgical work in which I have seen it mentioned is Cheyne and Burghard's *Manual of Surgical Treatment,* in which it receives mention in a foot-note to the description of Duplay's operation.

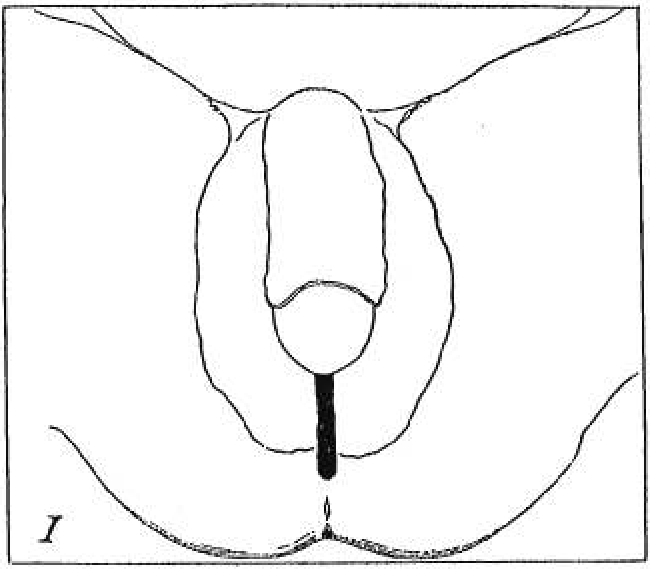
I desire now to suggest a modification of my method, which will, I believe, be a great improvement; and I shall seize the opportunity to redescribe the operation, as amended, with the utmost detail. My aim will be to provide any surgeon who desires to adopt this method with a trustworthy and sufficient guide in this paper. Let me frankly confess, also, that I desire to place my method side by side with that of Duplay, and claim the judgment of surgeons as to the respective merits of the two operations. I would only remark further, before beginning my description, that in introducing a new operation for hypospadias, one labors under a great disadvantage owing to paucity of opportunity for testing the method and of gaining experience in matters of technique; for cases of hypospadias do not come very frequently for operation. Hence it is not altogether surprising that in the two cases in which I have had the opportunity of performing my operation, the results obtained have fallen short of perfection; nevertheless, they are such as to convince us, I think, that results so excellent as to approach very near to perfection will assuredly be obtained by this method, and without very much difficulty.

The conditions present in a case of complete perineo-scrotal hypospadias are shown diagrammatically in Fig. 1. The scrotum is cleft, simulating the labia of the female; the urethra opens far back in the perineum, but from the orifice an open perineal urethra passes forwards as a sulcus lined with mucous membrane towards the pubic arch. At this point it terminates in a short fold of skin, a kind of frænum, which holds the glans penis incarcerated. The penis is thus bent into the form of an almost complete circle, the frænum alone intervening between the glans and the root of the organ. From the frænum, the skin spreads out fan-like in the concavity of the organ, to surround the corpora cavernosa. The corpus spongiosum and urethra are absent, but the place of those structures is taken by short dense bands of fibrous tissue, which are met with in the operation, and will be duly referred to. In the peno-scrotal form of hypospadias, the urethral orifice will be immediately in front of the scrotum, but the penis will be malformed, and incarcerated in the same manner as in the more complete form just described. It will also be amenable to operative treatment, such as I am about to describe, with only such modifications as are obvious. In the milder penile forms of hypospadias, in which the organ is perfectly free, and in which there will be no obstacle to its utility as a sexual organ, no operation is, in my opinion, called for.

The Two Aims of the Operation.—It is obvious that the victim of hypospadias suffers from two grave disabilities. He can never be capable of sexual congress; and he will be unable to micturate as other men perform that act. The two aims of the operation must therefore be (1) to release the organ from all its bonds, so that when erect, it shall be straight; and (2) to continue the urinary channel forward from the perineal opening to the end of the penis. My method consists of two operations. At the first operation, the penis is released and straightened and the glandular portion of the urethra is formed, and lined with preputial skin. At the second operation, the perineal and penile portions of the urethra are formed and closed, so as to complete the channel from the perineal opening to the glandular urethra. For this operation, suprapubic drainage is employed. A year or more should be permitted to elapse between the two operations. In all the diagrams, the mucous membrane of the open perineal urethra is represented black; the shaded areas represent raw surfaces.

First Operation.—Preparatory to the operation, the patient, if a child, should be put into a double long splint for a day or two beforehand. The position at the operation will be the extreme lithotomy position, with the buttocks well raised on pillows to suit the surgeon's convenience. The steps of the operation are indicated by Roman numerals.

I. The glans is seized in a suitable tenaculum and drawn upwards with the left hand. The surgeon feels the fan-like frænum of skin binding down the penis and divides it transversely, liberating the glans. He continues the division of the skin freely on both sides until the body of the organ is reached; it will then be only partially straightened. He now finds the organ held down by dense fibrous bands, which occupy the place of the corpus spongiosum in the concavity of the penis. The more prominent of these bands are dissected out clean, and any remaining portions, together with tight portions of the sheaths of the corpora cavernosa are snipped with scissors, as they are felt to be made tense by the upward traction on the glans. This process is continued until the penis is completely released and can be drawn out straight. The result of this proceeding will



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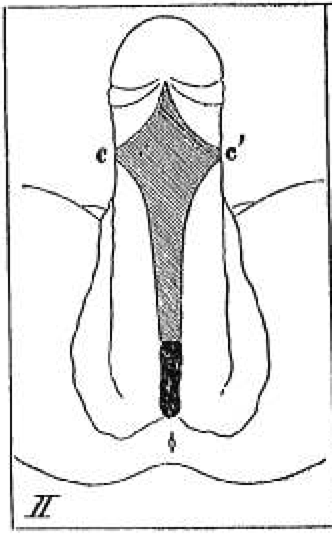

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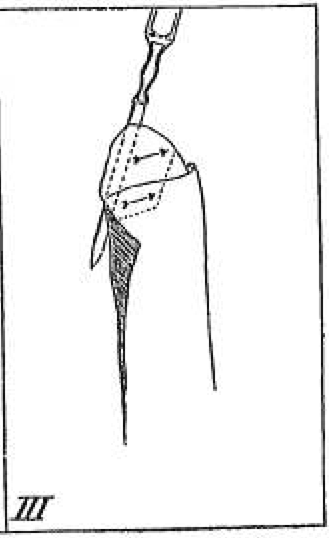
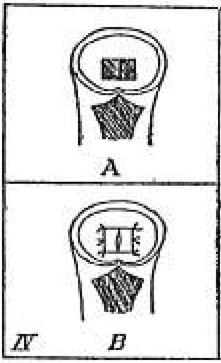
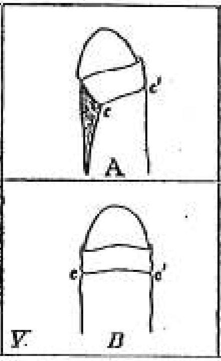


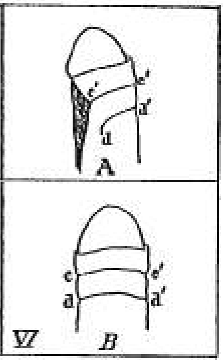
III

be the long diamond-shaped raw surface represented in Fig. 2; the lateral angles of the diamond (C C′) are formed by the ends of the transverse cuts through the fan-like frænum. Note that the transverse incisions must be so directed as to bring the lateral angles moderately high up near the glans and not down near the root of the penis.

II. The cutting of the channel through the glans for the reception of the glandular urethra. (Fig. 3.) Take a fine knife, and, holding the glans firmly in the left fingers, enter the knife at the tip of the glans where the floor of the meatus is to be, and thrust it through until the point emerges in the apex of the raw surface, just at the base of the glans. The edge of the knife is towards the dorsum. Cut freely towards the dorsum as the knife is being withdrawn (as indicated by the arrows in Fig. 3).



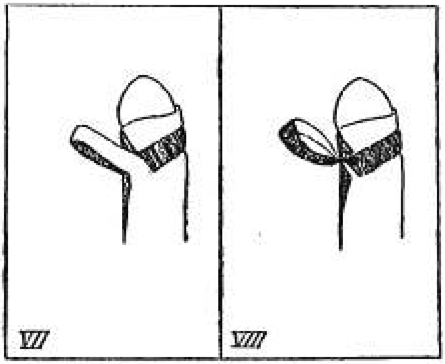




III. Raw a small area of the glans on either side of the new meatus; this may be done by grasping the glans firmly and shaving off a fine layer that includes the meatus. (Fig. 4, A.) In these two diagrams (Fig. 4, A and B) the meatus is drawn much too small. The incision of the glans should be much more free than is here shown.

IV. The first step in the cutting of the preputial loop with which the glandular channel is to be lined. Carry the knife from one lateral angle to the other (c to c′) across the dorsum of the penis, giving the incision a slight curve upwards as in Fig. 5, A and B.

V. Second step in the cutting of the loop. Parallel to the last incision make another below it (d to d′) as in Fig. 6, A and B; but in this case neither extremity of the incision is to reach the raw surface, but will rather take a slight deflection downwards at either end as represented in Fig. 6, A. Thus the dorsal loop of prepuce marked out by these two incisions retains a substantial connection at either end with the skin of the body of the organ. The width of this loop should be one-fourth to one-third inch, according to the size of the organ.



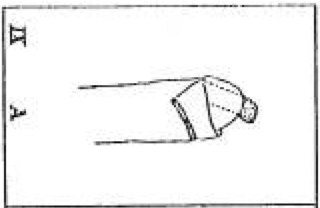
VI. Detach this loop from its bed, until it can be lifted up and passed over the end of the penis (Fig. 7).

VII. Turn the loop inside out, so that the cutaneous surfaces are opposed to one another. (Fig. 8.)

VIII. Pass a sinus forceps through the channel in the glans, seize the loop and draw it through. (Fig. 9, A and B.)

IX. The loop now protruding from the end of the glans is to be divided, and the two strips laid down over the raw surfaces on either side of the meatus, as shown in Fig. 4, B. They are neatly affixed with sutures, and the redundant portion of each strip removed. The result of this step is portrayed in Fig. 10.

X. It will now be found that all the skin edges will fall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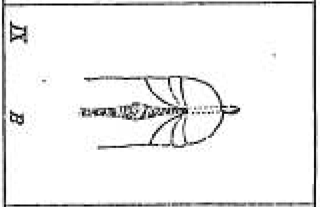
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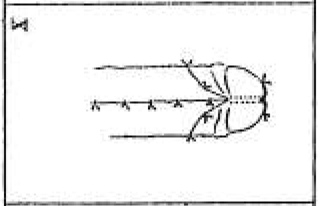
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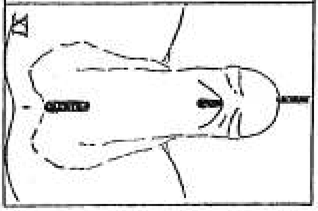
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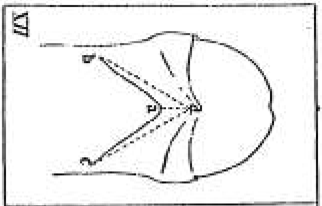
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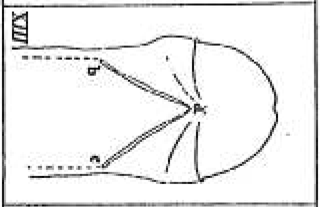
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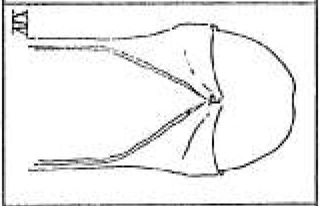
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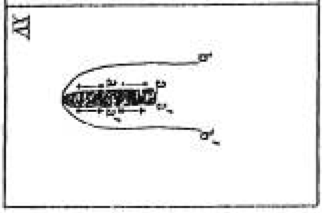
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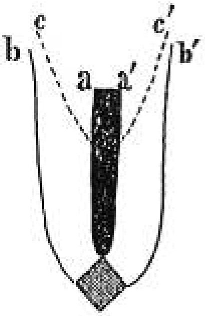
nicely into position, and are easily adjusted with sutures. The drawing of the loop through the glans will be found to have brought the lateral skin edges close together over the large raw surfaces, while the triangular flaps of skin attached to the



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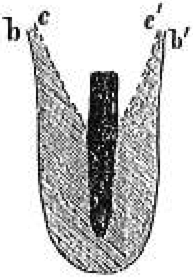

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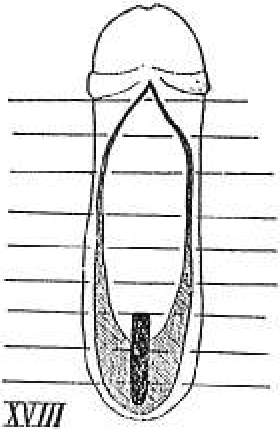

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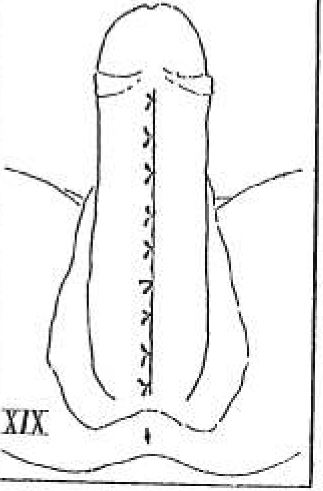


XIX

glans will fit readily into the angle made by the loop with the skin of the body of the organ. (Fig. 10.) A narrow bandage of iodoform gauze wound a few times round the organ makes a suitable dressing.

The child is put back into the splints on returning to bed and a rubber self-retaining catheter passed into the bladder through the perineal opening. In a patient old enough to be trusted, it would suffice for the catheter to be passed at intervals. No rod or any such appliance is to be placed in the glandular urethra. The reason for step III and the subsequent bringing of the strips of prepuce that line the glandular urethra well over on to the surface of the glans (step IX, Fig. 4, A and B) may require some explanation. It is designed to obviate the contraction of the meatus that will follow if the urethra terminates in a cicatricial ring, exactly at the meatus. By this device, stricture of the meatus is completely prevented.

The final result of this operation after healing has taken place is depicted in Fig. 11, in which a bougie is shown passed through the glandular urethra.

Second Operation.—The problem is now to construct a perineal and penile urethral channel that shall be continuous posteriorly with the existing urinary channel, and anteriorly with the new glandular urethra. The operation is divisible into the three following stages, which will be described in the order named:

I. The preparation of the anterior penile urethra and the point of its junction with the glandular urethra.

II. The preparation of the posterior penile urethra and the point of junction with the existing channel.

III. The final closure by suturing.

Suprapubic cystotomy must be performed and the bladder efficiently drained; this may be done as a preliminary measure, or preferably (I think) left until the second stage has been completed, prior to the suturing. A pair of fine ophthalmic scissors and toothed forceps I have found very useful. The steps of this operation, which are not quite so easy to describe or to follow as those of the first, are as follows:

I. Starting anteriorly, note in Fig. 12 the two folds of skin (ab, ac) that diverge from the opening of the glandular urethra to be lost on the body of the penis; these are guides for the direction of incisions for making the penile urethra.

Fig. 12 represents this region enlarged for clearness of demonstration; a is placed at the urethral orifice beneath the apex formed by the two folds of skin ab, ac.

Make first the short incision ad, which slits up the new urethra for about one-eighth inch. This will make the angular flaps dab and dac. Mentally complete the two triangles dab and dac by the dotted base lines db and dc.

II. With fine forceps and scissors seize each triangle in turn and cut it away along the base lines db and dc respectively. The appearance will be that portrayed in Fig. 13, which shows the cut edges of the two layers of skin of which the folds are composed; the inner layer is part of the preputial loop which has become the lining of the glandular urethra; the outer layer is continuous with the skin of the body of the penis.

III. Start the lateral incisions for the penile urethra from the points b and c respectively, and carry them down the penis as indicated by the dotted lines (Fig. 13). It is clear that the penile urethra will be perfectly continuous with the glandular portion (Fig. 14). We now leave this part of the field and turn to the perineum. Draw apart the cleft scrotum and observe the two following landmarks, which are represented enlarged and very diagrammatically in Fig. 15.

(1) The fine ridge or crest (a a′) that separates the mucous membrane of the perineal urethra abruptly from the skin of the perineum. (Note that I wish a a′ to indicate, not the short straight line at the anterior extremity of the urethra, but the long u-shaped a a′ that passes backward round the urethral orifice, and forward again, as indicated by the little arrows in the diagram).

(2) The surface line of the skin of the perineum (b b′) which overlaps a a′ posteriorly more than is shown in the diagram. Between these two lines, a a′ and b b′, there is an area of skin, broad behind and gradually narrowing anteriorly,

that is to be removed, leaving a raw surface. Proceed as follows:

IV. A short median incision backward through the skin only, so as to completely expose to view the hinder part of the perineal urethra and the existing orifice. This incision will create the small quadrilateral raw surface shown in Fig. 16.

V. Separate accurately the perineal mucous membrane from the skin, along the u-shaped line a a′. A good way to do this is to take fine scissors and clip away the thin crest that separates mucous membrane from skin along the line a a′. Note that this procedure must be carried forward only so far as to the point where the dotted lines meet the perineal urethra (Fig. 16). At this point the mucous membrane must be left and the demarcation continued forward in the form of an incision along the dotted lines (c c′). This is to obviate undue narrowing of the urethra, with which we are threatened at this spot. The line of separation between urethra and other structures having been thus laid down, dissect away all the skin intervening between a a′ and b b′, as indicated by the shading in Fig. 17. This will leave a broad raw surface in the perineum, narrowing as it passes forward.

VI. The operator must now strike a line for the lateral incisions that have been already made in the penile portion. In doing this, he for the first time seems, as it were, to leave the track and travel across country through, it may be, rather doubtful-looking scrotal tissue. He must just plan his incisions so as to make the junction of the penile with the perineal urethra uniform in calibre with the rest. Although this has been the only point in the procedure at which I have experienced some feeling of uncertainty, healing has been quite satisfactory in this part in both my cases.

VII. The entire length of the new urethra has now been marked out. The skin composing it is now to be carefully raised on either side, working towards the median line, sufficiently to permit it to fold easily over to make the new urethra, without the least tension. All is now ready for the suturing.

VIII. Fig. 18. The new urethra and the skin of the penis are now brought together throughout by a series of sutures. Each suture includes four layers of skin, the needle passing in order through outer skin and urethral skin of one side, then through the urethral skin and outer skin of the other. I need not dwell on the necessity for extreme delicacy and accuracy in the performance of this final step of the operation on the penile portion of the urethra, which is the only part of the operation in which the result is at all precarious. The perineal portion, where the surface is broad, scarcely needs any suturing; the sutures there will, of course, just miss the mucous membrane.

Fig. 19 shows the operation completed.

The penis is dressed as before by bandaging with an iodoform gauze bandage, and a pad of the same material is applied to the perineum. The patient is placed in his splints with the bed-foot raised. The after treatment is that of a case of suprapubic drainage. It should be possible to dispense with the drain in a week or ten days.

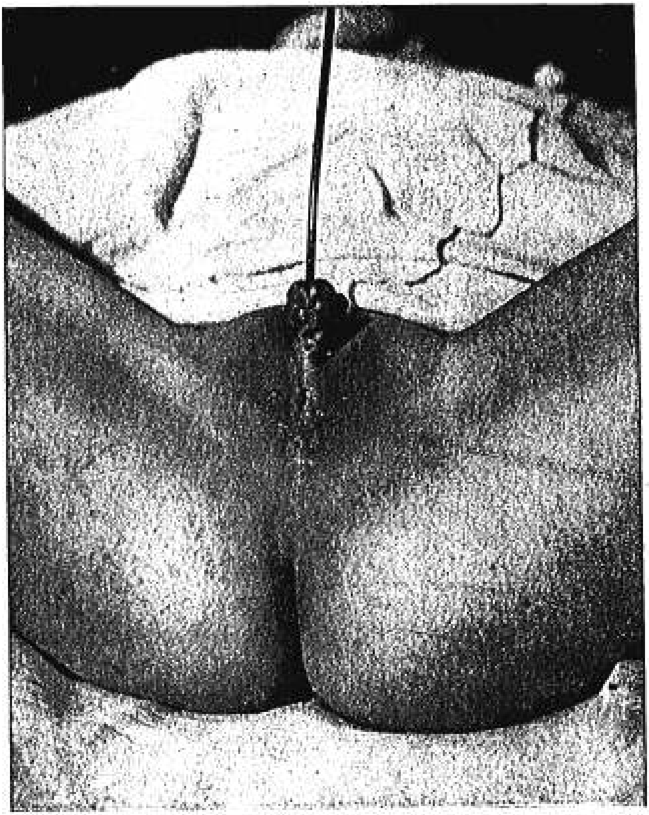
It will be noted that the foregoing description is somewhat different from that given in Jacobson's "Operations." My experience in my second case has shown me that it is wiser to be content with forming only the glandular portion of the urethra at the first operation, leaving the penile and perineal portions to be formed together at the second, as I have here described. My original suggestion was to form the penile and glandular portions together at the first operation, leaving only the perineal portion for the second. The new plan is the better, if for no other reason than that the patient will be older, and the conditions more favorable to the good healing of the penile portion of the urethra, which is the only precarious part of the undertaking. Had I done this, the result would, I think, have been perfect in the second case, instead of imperfect.

Age at Which the Operation Should be Undertaken.—Other things being equal, the larger and more substantial the parts and the tissues, the better; therefore, the nearer to manhood the better. Social considerations, however, indicate strongly that the operation should be undertaken about the age of 8 or 9 years or thereabouts, provided the parts are fairly well-developed; for it is obvious that a boy will be in a large measure debarred from association with his fellows if he is unable to micturate in masculine fashion. Under no circumstances, however, should any attempt at operation be made at an earlier age; and if the penis is ill-developed, operation must be postponed until the child is older. An operative failure will mean not merely that the operation will have to be repeated, but what is of greater importance, that any future operation will be gravely prejudiced by the presence of cicatricial tissue.

My first case has been already published (*vide British Medical Journal*, November 17, 1900), but I am enabled to give the following recent notes:

After History of Case I.—This boy was operated upon in 1899, being then in his ninth year. The result was a perfectly released penis, and complete closure of the urethra with the exception of a small hole just behind the glans. I have been fortunate in obtaining a report on his present condition through the kindness of Dr. Bush, of Rutherglen, Victoria, who visited him at my request, and has furnished me with the following interesting particulars. The boy has now turned 16 years. The glandular urethra is patent and the greater part of the urine passes through it, but some comes through the hole in the urethra; this hole would just about admit a small wax match. The left testis has descended, and is apparently normal in size and shape, and is contained in a definite scrotal sac. The right testis has not descended, and the position of its sac is occupied by a labium-like eminence seemingly composed of scrotal tissue. Dr. Bush formed the opinion that the penis would be quite efficient as a sexual organ, provided the rest of the sexual apparatus becomes normally functional, but he adds the following remarkable but somewhat disquieting particulars. The boy has developed feminine breasts; "not a mere slight swelling of the male breast, but such a breast as you would expect to find on an average virgin of the same age. There is a well-developed nipple, surrounded by areola in each case, and the breast has the lobulated glandular feel of a virgin breast. The diameter of each is approximately 5 inches, and they are noticeable by their size when only a shirt

FIG. 20.



Case II. Result.

is worn." The boy's appearance in general is feminine. I had asked Dr. Bush to inquire whether he had been always able to micturate in the presence of other boys, or to strip in their company, without the secret of his malformation being detected; but Dr. Bush ascertained that he had never done either of these things, owing to bashfulness. So far as was ascertainable by cautious questioning, there did not seem to have been any kind of sexual awakening, but Dr. Bush very wisely did not pursue this line of investigation.

Case II.—This patient passed the first three years of his life as a girl; his true sex was only discovered on his being brought to me at the Children's Hospital to be operated on for an inguinal hernia. The male organ was very small, but it subsequently developed well, and I performed the first of the two operations for hypospadias in the eighth year. The method followed was that described in my original article and in Jacobson's "Operations." The formation of the glandular urethra was perfectly successful, but the bringing together of the long flaps to form the penile urethra was not satisfactory, and to this fact is due, I believe, the incomplete success of the second operation. In fact, the first operation resulted only in the formation of the glandular urethra, so that I was left with the penile and perineal portions to be formed at the second, exactly as I have described above, but with the great disadvantage that the penile skin had been damaged. The result is shown in the photo taken by my house surgeon, Dr. Balcome Quick (Fig. 20). It will be seen that there are one or two holes in the penile urethra, and I do not consider this a good result or a fair indication of what is to be expected from this method. Nevertheless, the boy's two great disabilities have been so far removed that it is doubtful whether it is worth while to do anything further. I intend to wait until the period of puberty has passed, and if he then desires it, it should not be difficult to remedy the defects in his penile urethra with the aid of another suprapubic cystotomy.

Comparison with Duplay's Method.—Duplay's method consists of three operations, of which the aims are as follows:

(1) The releasing and straightening of the penis.

(2) The tunnelling of the glans without any attempt to make a lining membrane to the urethra.

(3) The covering in of the perineal urethra, the forming

of the penile urethra, and the end to end junctioning of the three portions of the urethra as may best be managed. It is scarcely to be wondered at that this last operation is admittedly liable to multiply itself almost indefinitely and I suspect usually to fail ultimately. I wish to be scupulously fair, but I am honestly at a loss to determine whether the success or the failure of this last part of the operation would be the greater misfortune for the patient.

Thus, I hold that the defects of Duplay's operation are that the glandular urethra is a mere sinus through cicatricial tissue, and that there is very imperfect continuity between the three portions of the urethra. Either of these defects alone would, I submit, be absolutely fatal to any claim for excellence that could be put forward on behalf of Duplay's operation. Both these objections are met in the foregoing method of two operations that I have described. Moreover, I would further point out, what any surgeon who has closely followed my description will perceive, that the two operations I have described are not really difficult. Surgeons leaning towards plastic work will easily obtain perfect results by this method.

Duplay's operation, on the other hand, is not merely extremely difficult; it is in my opinion virtually impossible. By this I mean that although doubtless the patient's condition would be greatly improved by the releasing and straightening of the penis, it is impossible to obtain a satisfactory result in respect of the urinary passage. Surgeons are always gratified at achieving successes in plastic work and pleased to display them, and there is no class of surgical cases so suitable and interesting to submit for inspection at medical societies and so forth. I have, however, never in my life known a surgeon anxious to show a result obtained by Duplay's operation for hypospadias. Is it vain for me to cherish the hope that I may hear of very gratifying results obtained by the skilful carrying out of the procedures that I have described with, I fear, almost wearisome minuteness, in this paper?

For the beautifully executed diagrams that illustrate this paper, I am indebted to my friend, Dr. Oswald Shields.